other according to their crystal volume or their actual volume as the case may be. (6) Many crystals which have heretofore been considered eutropic or isomorphic are not so, since they probably possess a larger or smaller molecular weight according to the number of atoms.

THE additions to the Zoological Society's Gardens during the past week include a Common Marmoset (*Hapale jacchus*) from South-east Brazil, presented by Mrs. A. H. Browne; a Crowned Duiker-Bok (*Cephalophus coronatus*, ♂) from West Africa, presented by Mr. A. Nightingale; a Nightjar (*Caprimulgus europæus*), British, presented by Mr. Richard Catter; a Dusky Parrot (*Pionus fuscus*) from Guiana, presented by Mr. F. Scammell; a Scarlet Snake (*Cemophora coccinea*), an American Black Snake (*Zamenis constrictor*), two Testaceous Snakes (*Zamenis flagelliformis*), a Mexican Snake (*Coluber melanoleucus*), a Hog-nosed Snake (*Heterodon platyrhinos*), a King Snake (*Coronella getula*) from Florida, presented by Mr. J. H. Fleming; a Sœmmerring's Gazelle (*Gazella sœmmerringi*, ♂), a Striped Hyæna (*Hyæna striata*) from Egypt, deposited; a Golden Plover (*Charadrius pluvialis*), a Grey Plover (*Squatarola helvetica*), a Ringed Plover (*Ægialitis hiaticula*), a Bar-tailed Godwit (*Limosa lapponica*), British, an Eyra (*Felis eyra*) from South America, purchased.

OUR ASTRONOMICAL COLUMN.

CONJUNCTION OF VENUS AND JUPITER.—These brilliant planets may now be observed near together in the morning sky, and are rapidly approaching each other. Conjunction will occur on October 19 at 9h., when Venus will be only 0° 28′ N. of Jupiter, but they will be below our horizon. As a spectacle for the naked eye the varying positions of the two objects will be very interesting at about this period. Their times of rising and distances from each other on several mornings will be as follows:—

Date.	Venus rises.	Jupiter rises.	Approx. distance.	Sun rises.
	h. m.	h. m.	°	h. m.
Oct. 16	3 37 a.m.	3 59 a.m.	4	6 27
,, 17	3 40 ,,	3 56 ,,	3	6 28
,, 18	3 43 ,,	3 54 ,,	2	6 30
,, 19	3 46 ,,	3 51 ,,	1	6 31
,, 20	3 49 ,,	3 48 ,,	¾	6 32
,, 21	3 52 ,,	3 45 ,,	1½	6 34
,, 22	3 55 ,,	3 42 ,,	2¼	6 36
,, 23	3 58 ,,	3 40 ,,	3¼	6 38
,, 24	4 1 ,,	3 37 ,,	4¼	6 40

The star η Virginis (mag. 4·1) will be about 5° E. of the two planets on October 20. Venus will pass 0° 15′ N. of the star on October 23, while Jupiter will pass 0° 15′ S. of it on November 15. On the morning of October 24 the waning crescent of the moon will be about 7° S. of Venus, and a similar distance S.E. of Jupiter.

Conjunctions of Venus and Jupiter are not separated by a constant interval, but occur once at an interval of about 304 days, and then twice at intervals of about 443 days, as the following table of twelve conjunctions ending with that of October 29, 1899, will show. But this sequence is not invariable, for in the years 1861, 1862, and 1863 and 1882, 1883, and 1884, three successive conjunctions occurred at the interval of about 443 days.

Date of conjunction.	G.M.T.	Relative positions.	Interval in days.
	h.	° ′	
1888 January 2	4	♀ 1 51 N.	—
1888 November 1	9	1 31 S.	304
1890 January 18	21	0 26 S.	443
1891 April 7	9	0 13 N.	444
1892 February 5	22	0 1 S.	304
1893 April 28	17	0 4 N.	448
1894 July 19	20	0 51 S.	448
1895 May 18	4	2 5 N.	303
1896 August 2	11	0 40 N.	442
1897 October 19	9	0 28 N.	443
1898 August 19	6	1 51 S.	304
1899 October 29	13	♀ 0 33 S.	436

On October 21 next, at about 6·45 a.m. the relic of the great red spot, if still visible, will be presented nearly on the central meridian of Jupiter, and if the weather is clear, an excellent opportunity will thus be offered for securing an early observation of this remarkable feature

THE LEVEL OF SUNSPOTS.—Prof. H. Riccò brings together some statistics in reply to the recent discussions relating to the question of "Are sunspots cavities or not?" (*Astrophysical Journal* for August). The observations discussed were derived from a series of drawings of sunspots made by the method of projection in the years 1880 to 1890 at Palermo with a refractor of 0·25m. aperture, and at Catania with a refractor of 0·33m. aperture. The projected image was in all cases 0·57m., a size sufficient to satisfactorily show the principal details of the spots. The result of the discussion, as will be seen from the following figures, shows that the number of spots near the limb, whose projected form gave a result conforming to the theory of Wilson, greatly exceeds the number of contrary or uncertain cases. The facts show that from the years 1881 to 1892 the proportion of cases favourable, unfavourable, and neutral, were in the proportion of 7·3 to 1 to 2. If greater weight be given, as Prof. Riccò says, to spots near the sun's limb, the penumbra of which conforming to the appearance of a cavity seen in perspective is invisible on the side opposite the limb, "I have found twenty-three cases of this sort in the eleven years, and only one contradictory case." Prof. Riccò acknowledges the importance of the problem of the constitution of sunspots and the difficulties involved, and advocates Mr. Evershed's suggestion that the radiations of sunspots should be studied in a more complete manner.

THE ORBIT OF COMET 1822 IV.—On July 13, 1822, Pons, at Marlia, near Lucca, in Italy, discovered a comet which, two months later, reached its maximum brightness, developing about this time a stellar nucleus of the ninth or tenth magnitude. The observations extended over a period of several weeks, and the most satisfactory elements computed were obtained from the investigation carried out by Encke. A new and interesting computation of the elements of this comet has been undertaken by Dr. A. Stichtenoth (*Untersuchung über die Bahn des Cometen* 1822 IV., Leipzig, 1897, W. Engelmann) in his Doctor's dissertation presented before the Göttingen faculty. These new elements, which are not found to differ very much from those obtained by Encke, depend on 456 observations, which for the most part have been reduced directly from the original observations. Referred to the ecliptic they are as follows:—

$$\begin{array}{l}
T = 1822 \text{ October } 23{\cdot}772734, \text{ Paris M.T.} \\
\text{Log } q = 0{\cdot}0588426
\end{array}$$

$$\left.\begin{array}{lcrrr}
 & & {}^{\circ} & {}^{\prime} & {}^{\prime\prime} \\
\Omega & = & 92 & 44 & 23{\cdot}01 \\
i & = & 127 & 20 & 47{\cdot}95 \\
\omega & = & 181 & 4 & 38\ 08
\end{array}\right\} 1822{\cdot}0.$$

$$e = 0{\cdot}9963021$$

The investigation tells us that the period of revolution corresponding to the above value of the eccentricity, namely 0·9963021, amounts to 5449·0 years; but on account of the length of the elliptical orbit, this value of the eccentricity can be varied considerably without in any way interfering with the calculated positions: thus the period of revolution may be said to lie between 4504 and 8748 years.

A point of additional importance and of considerable interest which this new discussion of the observations discloses, is that an examination of the original manuscripts of Gambart and Olbers shows that the appearance of this comet was somewhat analogous to that of Comet Holmes. Gambart observed, namely on 1822 July 26, a sudden brightening of a stellar-like condensation in the nucleus, which at the beginning of August had completely disappeared. On September 20 and 21 Olbers observed a similar increase in brightness, but the decrease took place more slowly than in the previous case. It appears, therefore, that sudden variations in the brightness of the cometary matter which occurred in this comet were similar to those which were recently noticed (1893 January 16) in Comet Holmes, and can be easily explained on the meteoritic hypothesis.

The above interesting fact, connected with this nearly forgotten comet, adds an extra feature to this most thorough and complete "Arbeit," and Dr. Stichtenoth is to be congratulated on bringing his computation to such a successful issue.

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THE LATE ALVAN G. CLARK.—Prof. Hale gives a brief obituary notice of the late world-renowned optician, Mr. Alvan Clark (*Astrophysical Journal* for August), which is accompanied by an excellent illustration showing him at the Yerkes Observatory with the crown lens of the 40-inch. In this notice Prof. Hale remarks : " It was no small proof of devotion to his work and interest in its successful termination that he should be willing to leave his home after a nearly fatal stroke of apoplexy, and to undertake a journey of over a thousand miles in order to accompany the 40-inch objective to its destination." We gather, also, that Mr. Clark considered the question of the possibility of constructing an objective still larger than his last great masterpiece, and, although fearing the effect of flexure, he considered it might be possible to still further increase the aperture without endangering the performance of the objective. Mr. Carl Lundin, who has been in the firm for five-and-twenty years, will continue to carry on the business.

A PLEA FOR A BUREAU OF ETHNOLOGY FOR THE BRITISH EMPIRE.

AT the meeting of the British Association at Liverpool last year, Mr. C. H. Read, of the British Museum, read a paper before the Anthropological Section, which deserves more notice than has been accorded to it. He urged that " what is needed in this country, with its vast colonial possessions, is a Bureau of Ethnology, such as has now existed for some time in the United States. The value of such an institution for our empire can scarcely be estimated. That its tabulated researches would be of the greatest importance to science will not be doubted ; but its strongest claim to existence as a national institution is the immense service it would render, first, to the officers governing our distant possessions, and, second, to the Central Government at home, who would thus have in the compass of a modest library a synopsis of the history, manners, customs, and religious beliefs of the innumerable races composing the British Empire. In a word, we should have at hand the means of understanding the motives which influence the peoples with whom we are constantly dealing, and thus be able to avoid the disagreements arising from ignorance of their cherished prejudices and beliefs." He then referred to the Bureau of Ethnology in Washington, which was created with the quick decision of a practical people when they realised that they had at their doors a race that was fated to disappear within a measurable time, and that it was their duty to record the history, beliefs and culture of the vanishing American Indian before the opportunity had passed away for ever.

Prof. Max Müller, at the meeting of the British Association which was held at Cardiff in 1891, is reported to have said : "Our American friends have perceived that it is a national duty to preserve as much as can still be preserved of the languages and thoughts of the indigenous races who were the earliest dwellers on American soil. They know that the study of what might be called intellectual geology is quite as important as that of terrestrial geology, and that the study of the lower strata contains the key to a right understanding of the higher strata in the growth of the human mind. Coming generations will call us to account for having allowed the old world to vanish without trying to preserve its records. Some years ago I had succeeded in persuading a Secretary of State for the Colonies that it was the duty of the English Government to publish a series of colonial records, containing trustworthy information on the languages, customs, laws, religions and monuments of the races inhabiting the English colonies. Lord Granville saw that such an undertaking was a national duty, and that the necessary funds should be contributed by the various colonies. Think what a magnificent work this would have been ! But while the American Government has pushed forward its work, Lord Granville's scheme expired in the pigeon-holes of the Colonial Office. America may well be proud of Major Powell, who would not allow the treasures collected by various scholars and Government officials to moulder and perish."

The splendid series of reports and the collections of ethnological specimens in the National Museum at Washington, attest to the ability with which this department is conducted. The appropriation by Congress for the fiscal year 1891-92 "for the purpose of continuing ethnological researches among the American Indians" was 50,000 dols. During the same year six ethnologists and seven archæologists were on duty in the field, besides the work done in the Bureau in Washington.

Mr. Read, however, did not propose that in England we should found a Bureau on precisely the lines of the American one. The conditions of the two countries are not sufficiently alike, but the point he urged was : " If the Government of the United States thinks it worth while to be at so much pains, and to incur such an outlay, in order to place on record the history of the one race with which they have to deal, how much more is it the duty of Great Britain to attempt some record of the many vanishing or, at any rate, quickly-changing races within her borders ? I would not only say that it is a duty, but I contend that it would be greatly to the interest and profit of England to institute an ethnographic survey of the native races within and upon the borders of her empire. Colonial history is not very ancient—some of it very recent indeed ; but how common it is in the history of almost all our colonies to find skirmish after skirmish with the natives arising from ignorance of the native customs and beliefs on the part of the white man, resulting in much trouble to the latter, and, in far too many cases, in the annihilation of the unfortunate natives. The study of ethnology would not entirely prevent such misunderstandings, but it would tend to remove them more quickly if they should occur. An officer who, possessing other qualifications, applies himself to the systematic study of the peoples around him, so that he can readily enter into their methods of thought, and interpret their actions as well as their words, is, I contend, a more valuable agent than one who merely gives his mind and his time to his strictly official business, and his work should be considered of greater value by his superiors at home." Mr. Read alluded to the attempt in this direction of one of the Governments of India, the Madras Presidency, and the labours of Mr. Man and Mr. Portman in the Andaman Islands, Sir Harry Johnston in Africa, and of Sir William McGregor in New Guinea. He advocated (1) that the reports should be systematised and on a uniform method in an office in London ; (2) that such work should be held to be part of the duties of the officer on duty abroad ; and consequently (3) the officer should obtain credit for such work when well done.

The following resolution was referred to the Council of the British Association : " That it is of urgent importance to press upon the Government the necessity of establishing a Bureau of Ethnology for Great Britain, which, by collecting information with regard to the native races within, and on the borders of, the Empire, will prove of immense value to science and to the Government itself." The Council subsequently appointed a Committee consisting of the President (Lord Lister) and General Officers, with Sir John Evans, Sir John Lubbock, Mr. C. H. Read, and Prof. E. B. Tylor. The report of this Committee was presented to the Council of the Association at the Toronto meeting. It dealt with the urgency, so far as science is concerned, of the need of collection of facts and with the benefit to the Government of these inquiries. Finally it was pointed out that " the collecting of the necessary information for the Bureau could be done with but little expense and with a very small staff only, if the scheme were recognised and forwarded by the Government. The Bureau itself, the central office, would be of necessity in London. The Colonial Office would obviously present some advantages. The British Museum has been suggested, with good reason, and there appears to be no insuperable difficulty if the Trustees are willing to undertake the responsibility of controlling such a department. The staff would not be numerous. A director accustomed to deal with ethnological matter would necessarily direct the conduct of inquiries, and until the material assumed large proportions two or three clerks would probably suffice. If the value of the results were considered to justify it, the increase of the area of operations over the world would probably call for additional assistance after the Bureau had been at work for a few years " The Council resolved that the Trustees of the British Museum be requested to consider whether they could arrange for the proposed Bureau to be established in connection with the Museum ; and if they are unable to sanction this proposal, that the authorities of the Imperial Institute be requested to undertake its establishment.

The present writer remarked some years ago :—" Such a Bureau would serve as a great stimulus to those who are interested in native races, but who require encouragement and direction. There can be little doubt that an immense number of isolated observations are lost for the lack of a suitable depository, the observers being fully aware that these are too casual to be of

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